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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/017,325	12/14/2001	Tomohiko Shibata	782_206	8198
25191	7590	03/17/2004	EXAMINER	
BURR & BROWN PO BOX 7068 SYRACUSE, NY 13261-7068			IM, JUNGHWA M	
			ART UNIT	PAPER NUMBER
			2811	
DATE MAILED: 03/17/2004				

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/017,325

Applicant(s)

SHIBATA ET AL.

Examiner

Junghwa M. Im

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 22 January 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-14 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohba (US 5990495) in view of Kunisato et al. (US 6162656), hereafter Kunisato.

Regarding claims 1 and 11-13, Fig. 6 of Ohba shows a light-emitting semiconductor device comprising:

a sapphire substrate (10);

an AlN(Ga) layer (11) on the substrate, comprising a semiconductor nitride, the crystallinity of the AlN(Ga) being set to have full width at half maximum X-ray rocking curve value of 90 seconds or below(Abstract);

a semiconductor layer group (12, 13, 14, 15, 16) on the AlN(Ga) layer comprising a semiconductor nitride including at least Ga, and being independent from the AlN(Ga) layer, wherein the Al content of the semiconductor nitride (in an AlGa<sub>N</sub> layer;13) set smaller than that of the first semiconductor nitride (col. 6, lines 46-50).

Ohba shows the most aspect of the pending claim except “a buffer layer on the under layer comprising a second semiconductor nitride.” Fig. 1 of Kunisato shows a second semiconductor nitride (3; GaN) layer on the AlGa<sub>N</sub> (2; a first semiconductor nitride layer) below the contact layer GaN (4), thus a semiconductor layer group (an active layer) being independent

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from the second and the third semiconductor nitride layers. It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the teachings of Kunisato into the device of Ohba in order to have a GaN layer on the underlayer of AlN(Ga) to improve surface conditions as taught in col. 7, lines 48-63.

Regarding claim 2, the combined teachings of Ohba and Kunisato do not explicitly disclose that Ga content of the second semiconductor nitride is set not more than that of the third semiconductor nitride. However, it would have been obvious to have Ga content of the second semiconductor nitride set not more than that of the third semiconductor nitride with Ohba's teaching. Ohba discloses, starting on col. 11, line 39, that compositions of the layer formed on the underlayer(buffer layer) can be arbitrary, especially teaching that AlGaInN layer (the same composition of the instant invention) on the underlayer(buffer layer) minimizing the crystal defect (col. 11, line 65-col. 112 line 3).

Regarding claims 3 and 4, it is obvious that Al content of the first semiconductor nitride in the device of Ohba and Kunisato is set 50 atomic percentages or over since the AlN layer of Ohba has the same elements to that of the instant invention while showing the same characteristics in FWHM of X-ray curve.

Regarding claims 5 and 6, Ohba teaches wherein the AlN layer is formed at least 1100°C by a MOCVD method (col. 3, lines 54-68). In addition, "MOCVD" is a process designation, and would thus not carry patentable weight in this claim drawn to a product. See *In re Thorp*, 227 USPQ 964 (Fed. Cir. 1985).

Regarding claims 7 and 9, Ohba shows the thickness of the corresponding layers from Fig. 1-5.

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Regarding claim 8, Ohba discloses the nitrogen gas introduction into the surface of the substrate, thus indicating a surface nitride layer, to grow the buffer layer (Applicant's underlayer) with the treatment preventing the dissociation of the nitrogen atoms from the crystal implying the nitride formation on the surface of the substrate.

Regarding claim 10, Fig. 2 of Ohba shows gradual reduction of Al content.

Regarding claim 14, Fig. 1 of Kunisato shows the thickness of the buffer layer (3) is smaller than the thickness of the underlayer (2) and the thickness of the semiconductor group (5).

### ***Response to Arguments***

Applicant's arguments with respect to pending claims have been considered but are moot in view of the new ground(s) of rejection.

In addition, Examiner presents the remarks below in response to Applicant's argument.

Only difference between "buffer layer and underlayer" is semantics. Note that the buffer layer consists of GaN and the underlayer consists of AlN(Ga). Hence, there is no structural/material difference between two layers other than how they are referred to. Therefore, patentable distinction can not be made based merely on semantics.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Junghwa M. Im whose telephone number is (571) 272-1655.

The examiner can normally be reached on MON.-FRI. 8:30AM-5:00PM.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's

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supervisor, Eddie C Lee can be reached on (571) 272-1732. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

jmi



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